AppGeo Empowering People with Spatial Solutions

GIS Coordination Strategic Plan

For the Montana State Library

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by

Empowering People with Spatial Solutions

Applied Geographics, Inc.
33 Broad Street, Floor 4 | Boston, MA 02109
T. 617-447-2400 | info@appgeo.com

www.AppGeo.com

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Executive Summary

The Montana State Library (the Library or MSL) manages statewide geographic information system (GIS) datasets, geospatial services and technology, and geospatial data collection and aggregation throughout Montana. The Library, through GIS Coordination, brings together the many actors and actions needed to gather data, aggregate data into statewide quality-controlled datasets, disseminate datasets as digital files or through online services, teach people how to use MSL's geospatial data and promote self-sufficiency with it, and plan for improving and expanding the kinds of geospatial information available.

This plan, devised from an extensive information gathering and analysis process, proposes five strategic goals for MSL GIS Coordination:

- Improve GIS Coordination within the Library
- Improve Communication with Geospatial Stakeholders
- Develop policies and best practices for geospatial data
- Continue to improve the collection, maintenance, and dissemination of authoritative land information
- Create and strengthen partnerships

These five strategic goals build upon the Library's already impressive record of managing and providing geospatial data and serving as a statewide leader in GIS. Recommendations to achieve each goal are starting points for the Library to consider. Each of the five goals, and each of the 17 recommendations made across all the goals, are discussed within the plan.

Overall, the plan covers the next 4 to 5 years, depending upon when it is adopted. All of the goals are important, but some take precedence because other goals and recommendations build upon them or because trying to take on too much within a single period of time would risk accomplishing anything at all. The relative priorities of goals are discussed after the goals and recommendations themselves. A suggested order in which the Library might act upon the recommendations for each of the goals follows this overall priority discussion.

Montana State Library GIS Coordination has undertaken similar strategic planning efforts already. These earlier plans led to the success and reputation that the Library enjoys today. This plan may set the agenda for the next several years – that is its intent. However, any plan should be subject to review and revision due to internal and external situational change. The plan concludes with a section on measuring progress toward its achievement. In essence, the plan recommends the Library put in place a monitoring system that frequently assesses its own progress and performance in simple ways. This, in turn, is the foundation for a rational approach to continuous improvement in the performance of MSL GIS Coordination.

Introduction & Background

Purpose of the Plan

Montana is past the initial strategic planning stages of GIS in which one had to show the value and utility of geospatial data and GIS. This strategic plan starts from the foundation of a mature program that has proven its value to peer agencies, other governments, and the public.

Spatial information is now in the process of being integrated within government and daily life. The responsibilities and demands upon the Library's GIS Coordination change over time. This strategic plan looks forward from the present, providing goals and recommendations to keep the Library and Montana in the vanguard of state government GIS.

Brief Summary of Approach & Methods

The creation of this strategic plan involved three broad activities: determining stakeholders, gathering information from stakeholders and MSL itself; analysis of information gained during the information-collection activities; drafting strategic goals, and revising them based upon review by MSL. Specific actions taken were:

- Survey - technical and non-technical questions w/ logic
- Workshops Technical and Non-Technical (7/21/21 and 7/29/21, respectively)
- Interviews
- SWOT Compilation and Analysis
- Strategic Goal Drafting and Review

The strategic planning process began by issuing a stakeholder survey (summarized in Appendix 1). Two hundred and sixty-one (261) individuals responded to the survey (Figure 1). Participation varied by sector, with excellent participation by local government (49% of respondents), slight tribal participation (<1%), as well as participation from State government (21%), Federal agencies (4%), and other respondents (22%). Some of the questions had narrative response options in addition to pre-set choices. The statements made were often quite detailed and illuminated the respondent's thoughts about the Library's GIS Coordination. Most statements were positive or were offered in a spirit that was clearly intended to be constructive criticism.

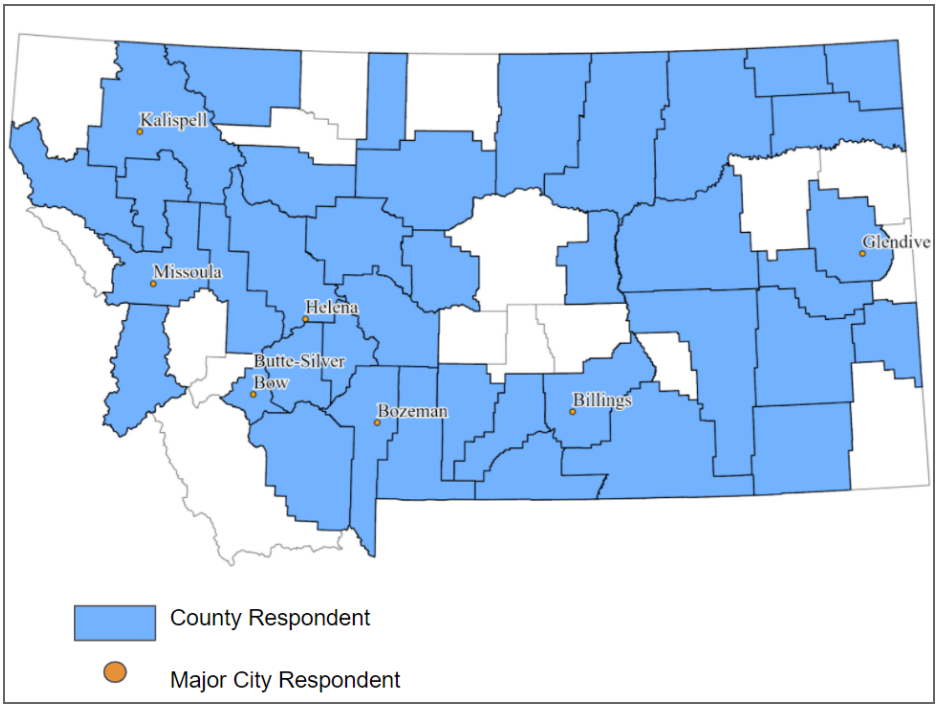


Figure 1. Geographic distribution of survey respondents

Following the survey, two online workshops were held. The first, on July 21, 2021 (Appendix 2), was geared towards the more technical stakeholders. Twenty-three individuals attended the 90-minute workshop. The second workshop, geared towards the non-technical stakeholders, was held on July 29, 2021 (Appendix 3). Forty-six people participated in the second 90-minute workshop.

The workshops began with a brief overview of strategic planning and a summary of the survey findings. In the first workshop, the group was then broken into three subgroups. The subgroups were presented with three questions, pausing between each session to rejoin as a larger group and present the subgroup discussions. The questions covered:

- MSDI and other GIS data
- MSL Priorities
- MSL Geospatial Role and Structure

In the second workshop, the group was broken into four subgroups. The subgroups were presented with three questions, pausing between each session to rejoin as a larger group and present the subgroup discussions (Figure 2). The questions covered:

- MSL Geospatial Mission and Role
- Geospatial Governance
- Data Clearinghouse

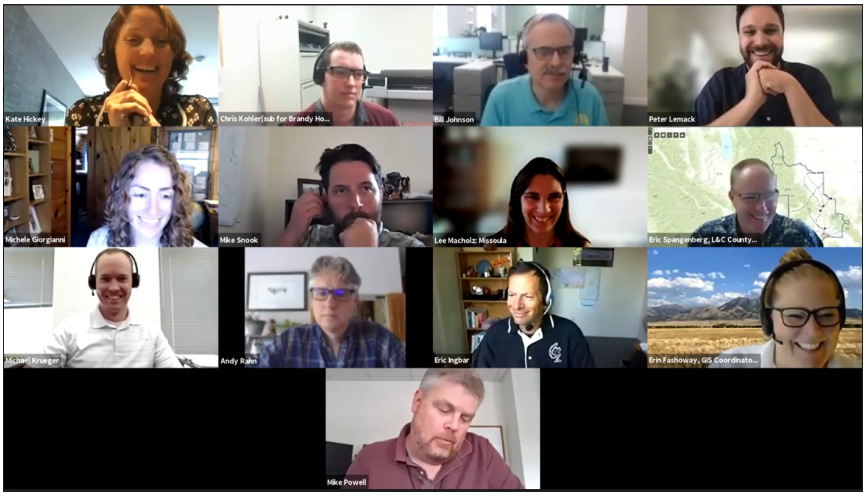


Figure 2. Some of the Technical Workshop participants sharing outcomes of a breakout session

Following the workshops, selected stakeholders were interviewed either in groups or individually (Appendix 4). Interviewees included a County Commissioner, a State Representative, local government staff (both GIS practitioners and others), state agencies, private company employees, tribal representatives, federal agencies, staff from non-profit organizations, surveyors, and the MSL project team. The hour-long interviews were conducted by the Applied Geographics team. The specific topics and questions in the eleven interviews varied by interviewee or interview group based upon the interview team's understanding of their relationship with the Library.

The three formal methods used to gather information were augmented by exploration of the Library's website, emails and conversations with the project team, and the study of supplemental materials provided by the project team.

Findings were compiled and analyzed using a Strength, Weaknesses, Opportunities, Threats (SWOT) assessment methodology. Single statements (S, W, O, or T) were created from survey responses, notes, interview reviews, and workshop discussions. Duplicates were eliminated and then grouped into broader, more general, summarized statements (Appendix 5).

The SWOT analysis provided the basis for initial goals and recommendations formulations. Goals were formulated at a high level in conjunction with recommendations that support achieving the goals and directly responding to the SWOT. The goals and recommendations were extensively reviewed with the project team.

The Current Situation

Strategic plans start from a current situation and look forward. MSL has been involved with GIS, and GIS coordination, for many years. These efforts provide the context for this strategic plan; the history of GIS

in Montana and previous planning efforts are discussed below because they aid in understanding the goals of this plan.

History of GIS in Montana

Montana was an early adopter of GIS. As far back as the 1970's, Montana was a testbed for the first Bureau of Land Management (BLM) and US Forest Service (USFS) GIS, called the Map Overlay and Statistical System (MOSS). Early on in the history of GIS technology, Montana state government, too, saw the value of systematic, digital, geographic information. Montana quickly recognized that sharing of information and thus *coordinating information* were important elements of effective information-based management. Montana state government, and other partners, made several important steps toward GIS coordination, starting more than forty years ago. These are listed here, drawn from *Montana Geospatial Strategic Plan 2006-2010* (2007), an FGDC-funded plan created for the Montana Land Information Advisory Council.

- 1982 – Montana Governor's Council on Management calls for greater coordination and information sharing among natural resource agencies
- 1983 – Montana Legislature creates Natural Resource Information System (NRIS) and the Natural Heritage Program, both of which involve spatial data
- 1985 – Montana Interagency Information Processing Coordinating Group is created by agreements between Montana Department of Natural Resources and Conservation, U.S. Forest Service, the U.S. Soil Conservation Service, the Bureau of Land Management, state universities, and others
- 1987 – Federal Superfund monies are used to establish the Montana State Library GIS program, primarily the Natural Resources Information System
- 1988-1990 – Interagency Technical Working Group is formed to identify essential statewide data themes, including recommending how to develop the actual data, laying the groundwork for the eventual Montana Spatial Data Infrastructure (MSDI)
- 1988-1992 – A professional GIS organization is formed and begins meeting regularly. The Montana GIS Users Group (MTGIS) is formally established as a consortium of all individuals and organizations using GIS technology to provide a forum for exchanging information and ideas. MTGIS operates for 14 years (until 2004) as a formal entity.
- 1995 – The Montana Local Government GIS Coalition is initiated by local government GIS users as a means for professionals in local agencies to share information and work together
- 1996 – The Montana Department of Information (DOA) establishes the GIS Section within the Information Technology Services Division (ITSD) Policy and Planning Bureau. Seven years later, the Section became its own bureau within ITSD Operations.
- 1997 – The Montana Geographic Information Council is created by executive order of Governor Racicot
- 2003 – The Montana Legislature passes the Montana Information Technology Act, making ITSD responsible for GIS technology management and coordination.
- 2004 – The Montana Association of Geographic Information Professionals (MAGIP) is formed by joint effort of the Interagency Technical Working Group, the Montana Local Government GIS Coalition, and MTGIS as a new non-profit volunteer organization bringing together all parties interested in GIS use, education, and applications

- 2005 – The Montana Land Information Act (MLIA) is signed by Governor Schweitzer, creating the Montana Land Information Advisory Council (MLIAC) and stable funding toward cooperative GIS development and completion of the MSDI themes
- 2006 – MLIAC successfully applies for Federal Geographic Data Committee funds to write a multi-year strategic plan the *Montana Geospatial Strategic Plan 2006-2010* (2007)
- 2007 – Data development of MSDI themes gathers momentum within ITSD GIS Bureau (cadastral, structures, and addresses, geodetic control) and the MSL NRIS programs (physical geography and natural resources)
- 2007-2011 – Montana State Library participates in Geospatial Multistate Archive and Preservation Partnership examining best practices for storing and sharing geospatial data
- 2008 – The ITSD GIS Bureau, under the guidance of the Montana Common Operating Picture, reorganized as the Montana Base Map Service Center and the Geographic Information Officer (GIO) position was created. The GIO
- 2010-2011 – the Montana Base Map Service Center is co-located with NRIS at the Montana State Library, effectively merging the partially overlapping programs. The GIO position remained with ITSD, and the position was later dissolved post-merger.
- 2011 – Montana State Library collaborated with the State of Idaho and other geospatial professionals on a business plan grant from the Federal Geographic Data Committee that defines how to develop a multi-state geodetic control network and real time high-precision network within the two states. As a part of the
- 2013 – The MLIA is amended by the Legislature, making the Montana State Library the host agency for the State GIS Coordinator, MSDI Stewardship, the MLIA Grant Program, the Council and State's primary point of contact for geospatial information and technology.
- 2014 – MSL, working with MAGIP, MLIAC, and a workgroup of the State Information Technology Managers Advisory Council, creates and shares *Montana Geospatial Strategic Vision*, a document advocating accelerating data development and, especially, the critical need for coordination and Montana State Library's role in that coordination
- 2018 – Governor Bullock works with Governor Inslee (Washington), along with Tribal, State, & local partners, to create the Montana State Reference Network (MTSRN), a cooperative test network for a proposed Real-Time GNSS Cooperative in the state of Montana
- 2018 - 2022 - Montana State Library creates Montana's first Elevation plan and collaborates with stakeholders, DNRC, NRCS, FEMA, Local Gov't, private/nonprofit, NSGIC, Tribal Partners, and the USGS 3D Elevation Program to collect lidar and work towards statewide lidar coverage.
- 2019 – The MSL and the Department of Conservation and Natural Resources formalize a plan for collaborative acquisition, storage, and distribution of statewide lidar (light image detecting and ranging) data, supporting MLIAC's 2018 designation of the MSL as the elevation data theme steward for the MSDI
- 2021 – The Legislature increases MLIA Recordation fees, funding for geospatial coordination, supporting more resources to accomplish the coordination and development of GIS within Montana State Library received one-time only funding to create the Montana Real Time Network (MTRN), and 10-year funding was allocated to MSL to provide GIS coordination for NG9-1-1 and data development.

As this history shows, even if one looks only at major events, coordination, data-sharing, and collaboration have been part of Montana GIS since its inception. Within state government, MSL is the focus of GIS coordination and much actual data development and many data services. As geospatial data

has become both popularized for public use and essential for government, the need for coordinating activities – between state agencies, with federal partners, and with the private sector – has grown accordingly.

The MLIAC, as the formal state body charged with determining how to populate the MSDI themes and communicating with the Legislature through the annual Land Information Plan (e.g., Land Information Plan 2022/2023), is an important coordinating node for GIS interests in the state. MAGIP, as a non-profit professional society representing all parties interested in GIS in Montana, is also a key node. MLIAC has an ex-officio member serving on the MAGIP Board of Directors and, in turn, MAGIP has two seats on the Montana Land Information Council. Montana is a member of National States Geographic Information Council (NSGIC), the GIS Coordinator represents the states interest on national initiatives in developing, exchanging and endorsing geospatial technology and policy best practices.

Through the MLIA, the Library is tasked with coordinating the acquisition, creation, maintenance, and dissemination of geospatial data within Montana state government and for the citizens of Montana. In order to accomplish these tasks, the State Library has the State GIS Coordinator position within the library staff. The State GIS Coordinator has the following duties (from: https://geoinfo.msl.mt.gov/Home/GIS_Community/GIS_Coordination):

- Acts as a major point of contact with representatives of federal, state, and local agencies and private enterprise on issues including GIS data standardization, data collection, and data prioritization
- Guides the development and maintenance of the Montana Geographic Information Clearinghouse
- Provides leadership and coordination in the conceptualization, development, and implementation of the Montana Spatial Data Infrastructure (MSDI)
- Staffs the Montana Land Information Advisory Council (MLIAC)
- Administers the Montana Land Information Act (MLIA) and MLIA Grant Funds
- Conveys complex GIS concepts to government officials, business leaders, and Montana citizens, including data relationships, data integration, data quality, and data limitations
- Researches and promotes new applications of GIS technology primarily, but not exclusively, within State Agencies
- Facilitates existing GIS Coordination activities in the state and promotes new public and private/public partnerships
- Represents the State on federal, state and local interagency geographic information coordinating committees such as the National States Geographic Information Council (NSGIC) and the Federal Geographic Data Committee (FGDC)

The Montana Land Information Act and the actions of the Library in concert with the MLIAC, MAGIP, peer agencies, and local governments have kept Montana at the forefront of states that plan for, develop, and use geospatial data and technology to make government more efficient and effective. Montana continues to enjoy a national reputation as a GIS leader. In fact, the National States Geographic Information Council (NSGIC) awarded an "A" to Montana in the Coordination category of the NSGIC Geospatial Maturity Assessment (Figure 3).

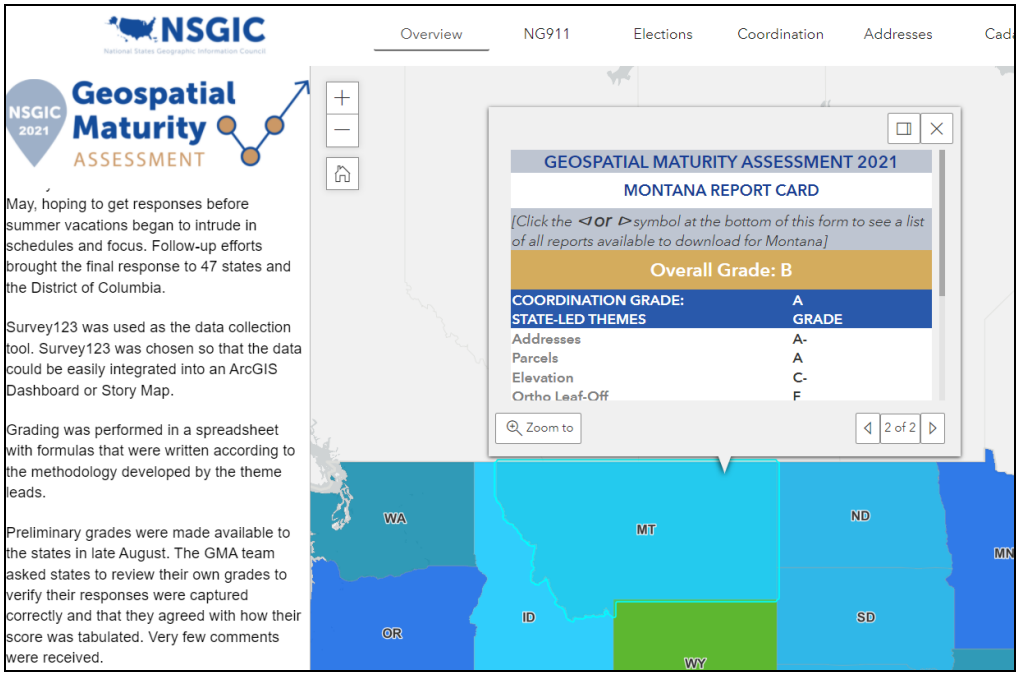


Figure 3. NSGIC Interactive Report highlighting Montana's Coordination Grade

Prior MSL GIS Coordination Strategic Planning Activities

Montana is familiar with the value of strategic planning. An initial geospatial strategic vision for the State was developed in 2014 for the State fiscal year 2015.

> *"Location based data is collected, maintained, distributed and used to improve the human and environmental condition to the extent that it becomes ubiquitous in public and private business processes."*

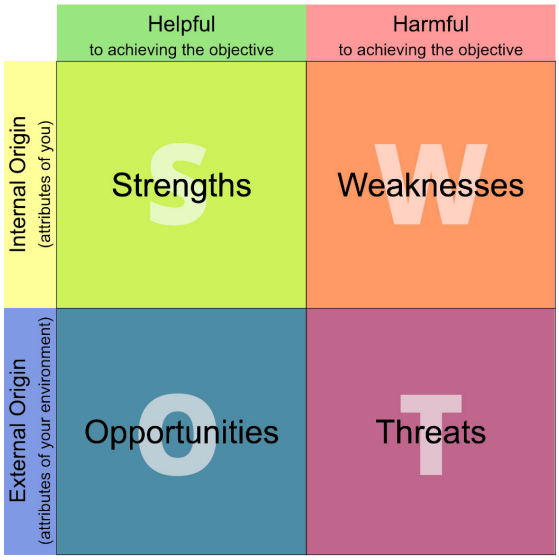
In the Montana Geospatial Strategic Vision document, organizations and tasks were identified to support achieving that vision. MSL, MLIAC, MAGIP, and the State GIS Community of Interest (COI) were asked to focus on achieving the vision through focusing on four areas:

- Financial support for the Montana Spatial Data Infrastructure (MSDI)
- Cooperative data stewardship
- Broad and encompassing geographic literacy
- Better integration of location-based data into public policy

Where Are We Now?

Strategic plans start from a current state of affairs and suggest a future state of affairs. The information-gathering phase of the strategic planning project yielded survey responses, comments (written and verbal), interview statements and notes, workshop ideas and discussions, and documents. (Appendices 1 through 4). The SWOT (strengths, weaknesses, opportunities, threats) methodology was used as a tool to organize findings and assist in determining strategic needs. In general, a SWOT assessment in strategic planning provides ideas to:

- Leverage strengths
- Address weaknesses
- Take advantage of opportunities
- Steer clear of threats



The summarized SWOT statements themselves are presented in Appendix 5. Here, each element is summarized briefly to describe the Library's current situation from a strategic planning perspective.

Strengths and Weaknesses

The SWOT analysis revealed tremendous strengths within the Library's coordination, data management, and services. Stakeholders of every sort -- professional, non-professional, governmental, non-governmental – appreciate the quality and general timeliness of the Montana Spatial Data Infrastructure (MSDI) datasets and the services through which they are made available. The Cadastral data and service applications are especially valued. This may be unsurprising given Montana's long history of active coordination and management of the datasets and partnerships that build this complex information set. The strength of Cadastral and the Natural Resource Information System (NRIS) all show the value of the Library's work to others.

The MLIA is, itself, an important reason for the strengths of MSL GIS coordination. The Act lays out a rational, well-governed, process for determining state priorities and implementing activities to meet them. Some interested parties, even GIS professionals, may be hazy on the details of the Act and how its coordination is performed (a minor program weakness), but the activities of the Library, the MLIAC, and the plans for each year's activities are well-rationalized and readily available to the public for review and comment. The Act is also written in a form that gives the Library and its Coordinator considerable flexibility both in how it discharges its duties regarding developing land information and in its ability to lead policy and process development at the state level.

The great strengths of GIS coordination at the Library are accompanied by some weaknesses. This is not unusual in any SWOT analysis, in part because the information-gathering process tends to invite ideas for improvement more than it seeks praise. Weaknesses are deficiencies that can usually be remedied, sometimes through relatively straightforward actions. The weaknesses revealed by the SWOT analysis fall in four areas: data and data services; communication and identity; coordination; governance.

Data and services are very well-received, as discussed above. Within the existing data and services, users were concerned about the difficulty of getting to spatial data and services due to formats and dataset sizes (e.g., for downloads of data). As well, users stated that data and services could be easier to find and perhaps less confusing to understand when trying to decide what data or services best meet a user's need. For instance, should one use the datasets from the MSL website (https://mslservices.mt.gov/Geographic_Information/Data/DataBundler/) or those data available from Montana's site on arcgis.com (https://montana.maps.arcgis.com/home/index.html)? Is there a difference in these data? These were questions raised by stakeholders during the information gathering process. Some part of data and services weakness also involves limitations on the knowledge and technologies available to users of the different systems managed by the Library. There was some sentiment that the Library could do more in the way of education and provisioning of resources and technical knowledge.

Communication and identity have to do with the perception of what the Library is doing and planning to do, and how the Library fits within the constellation of GIS in Montana government. The information-gathering process revealed that users of the Library's spatial data resources were not aware of the full range of activities the Library does, the data and services it provides, and how the Land Information Plan process works or their ability to participate in the planning process. GIS is widespread in government but the technology, its ubiquity, and the many benefits it does and will provide are poorly understood by many decision-makers, something that education and communication might address. As for the identity part of communications, Montana is unique in the United States, in that its primary GIS coordination and distribution are done through its state library. For those professionals who work in other places, the Library is not an obvious place to look for geospatial data and services. Some potential GIS users might assume the Library is an archive, not the authoritative source of statewide spatial data. To some degree, communication is also related to data and service issues discussed above. User expectations and GIS technologies change far more rapidly than one can revise and revamp the technical underpinnings of large, well-maintained, authoritative data systems. How the Library manages and plans to adapt to technology changes may not be clear to many of its users.

Coordination is central to the Library's role as called for in the Act itself and in other legislation that vests the Library with the management of other geospatial programs too (NRIS, Water Information). Weak points in the coordination area include the discovery of duplicate data development efforts and an associated tendency for work by one organization (e.g., a state agency) to be invisible to others (e.g., other state agencies and local governments). Grant administration is an important part of the coordination and capacity-building that fall to the Library under the Act. Some interviewees felt there was little reason for local governments (counties, cities, tribes) to maintain and contribute data needed

for statewide authoritative datasets. Though in part a communication issue, this is also a coordination weakness – making it easy for others to collaborate with MSL's data maintenance processes involves recruiting them as partners in some fashion.

Geospatial data governance is the last area in which weaknesses were revealed. The MLIA gives the Library a role of building policy that supports geospatial land information, particularly within state government. Some of the duplication and discovery issues cited above are coordination issues because, in the absence of clear governance policies about geospatial data, isolated efforts move forward in order for an agency to accomplish its work. Governance, as a weakness area, is also related to communication and identification: the GIS community and other stakeholders do not see that the Library's coordination work includes (or can include) developing long-term governance policies.

Opportunities and Threats

The Library is in a fortunate position, largely of its own making, with regard to opportunities. The foundation of more than 15 years of responsive, professional work has generally created a high level of trust amongst peer agencies and stakeholders. Some of the opportunities that GIS coordination at the Library could pursue include:

- Enhancing its collaborations with local governments by working directly with local governments, using currently funded initiatives (e.g., Next Generation 9-1-1), thus geo-enabling MSL collaborators and continuing to prove the value the Library brings to Montanans
- Continuing to tie together coalitions of stakeholders and others through the Real Time Network (RTN) and by serving as a repository of low distortion projections (LDPs), since these will only continue to increase in importance for many years to come
- Becoming the state's virtual clearinghouse for authoritative geospatial data within state government, i.e., across all state agencies, and serving as the obvious initial point of contact for those with questions about GIS in Montana
- Becoming the state's repository of authoritative geospatial data across all state agencies, thus providing an archive of historical geospatial data
- Educating decision-makers about the value of geospatial data and technologies and their coordination, using the expertise and resources of the Library's professional staff to do so
- Building new relationships with federal partners and formalizing those that already exist to make them more stable and long-term, including seeking partnering arrangements that provide more resources to the Library

The Library's GIS coordination effort faces few external, existential threats. Threats are important to recognize and act upon, often by addressing weaknesses or seizing opportunities. Some federal partnerships seem to be based on long-term individual professional relationships rather than agency-to-agency formal arrangements. These partnerships would be threatened by the departure of individuals either in the Library or the federal agency itself. The Library's programs would almost certainly sustain the loss of one or more federal partnerships, but geospatial coordination would be

weaker for it. The only other general threat revealed was that some users may distrust datasets or services provided by the Library due to lack of metadata, or a perception that the data was shared without a quality review, or is not authoritative. There could be many reasons for this, including ignorance on the part of users, but the *perception* that data is not authoritative would be harmful to the credibility the Library has gained and thus is to some degree an existential threat.

Vision

Montana State Library GIS Coordination empowers Montana to integrate geospatial policy, products, and information into business processes. These elements benefit Montanans in many ways, including, but not limited to:

- Public health (e.g., COVID-19 response and planning)
- Emergency services (e.g., Next Generation 9-1-1)
- Public trust in government (e.g., through elections support)
- Natural resource management and sound planning (e.g., through high-resolution data like LiDAR)
- Land management, planning, construction, and engineering (e.g., through the Real Time Network of high-resolution survey stations)

Strategic Goals and Recommendations

Each of the following strategic goals describes a desired outcome. The intent of the goals, and recommendations specific to them, is to state *what* should be achieved more than *how* to achieve the desired outcome. Recommendations that follow each strategic goal are more sub-goals than implementation statements. The recommendations (or sub-goals) included with each of the strategic goals complement and will help guide the Library in achieving the strategic goals. In some cases, recommendations verge into being so specific they read like implementation statements. Take these as ideas or suggestions, not specific action mandates.

Goal 1. Improve GIS Coordination within the Library

Goal Description

The Library is truly the GIS hub for the State of Montana. The Library has many geospatial responsibilities: creating and maintaining the Natural Resources Information System with other agency partners, creating and maintaining the Montana Spatial Data Infrastructure (MSDI) themes with local, state, and federal partnerships, working with the Montana Land Information Advisory Council (the Council) including managing grants provided through the Montana Land Information Act (the Act), and providing other state agencies with support for geospatial technology, licensing, and services. The wide scope and depth of the Library's geospatial mission depends upon active and timely coordination within

internal Library programs and with the Library's many stakeholders and partners. While enhancing coordination activities is an overall goal of this strategic plan, this goal specifically addresses internal Library GIS Coordination. The other goals in this plan are aimed at enhancing coordination among all stakeholders.

Recommendations

1.1 Clarify roles and responsibilities for MSL Work Group Areas as they pertain to geospatial activities. The Library has already defined an internal work group structure that includes its geospatial programs and activities. Within this structure, the interests of work groups that involve geospatial information overlap. Collaboration between work groups can be made more efficient by clearly defining the required roles. Stewardship defines who is responsible for the maintenance (of data, services, application, etc.). Coordination defines how the stewards work together to meet the needs of all work group areas, accomplishing the Library's mission. Furthermore, how the authority of Program Leads intersects with these roles needs to be defined clearly.

Goal 2. Improve Communication with Geospatial Stakeholders

Goal Description

A broad cross-section of Montanans, businesses, organizations, and governments at all levels are stakeholders in the products and services of the Library and, more generally, of work given priority in the Annual Land Information Plan. Many stakeholders may not even be aware of how these activities benefit them. Clear, targeted publicity about the Library's statewide geospatial coordination, its services, and its role in making useful data readily available will help the public and other stakeholders recognize the value of the Library's geospatial program and understand why it should continue to grow.

Even within the GIS professional community, there is incomplete knowledge about how the Library, the Council, the Land Information Plan, and the Natural Resource Information System (NRIS) all work together to plan for and develop authoritative statewide geospatial data and provide GIS services. Many professionals are focused on the end products and services that the Library provides and thus care most about being able to find these things easily. Communicating the "bigger picture" with this stakeholder segment through improved web presence and other means will aid the professional community, to the benefit of all parties who use Montana geospatial information.

Many geospatial stakeholders, including some professionals, just do not understand the effort required to keep statewide authoritative data up to date. Even fewer, perhaps, realize that the Library is helping Montana develop better geospatial data through grants to communities under the Montana Land Information Act by assisting county and municipal governments to use and manage geospatial

information. Educating stakeholders about their role in the process, and how the Library acts in their interests when that interest is expressed, builds trust and investment in statewide geospatial programs.

The Library already has strong overall public information mechanisms and communication tools. This goal builds on them, creating tailored, appropriate ways to convey the benefits, products, services, coordination efforts, and avenues for input to geospatial stakeholders.

Recommendations

2.1 Create and execute on a formal communications plan for GIS activities within the Library . This could be done internally or through a contract. The formal plan will serve as the handbook for the Library to improve communications with stakeholder groups and stakeholders regarding the MLIA Council, the MSDI, other GIS activities at the Library, and statewide GIS coordination activities. The plan should identify how communications will be sustained and supported over time.

2.2 Reorganize the Library GIS web content to make it easier to discover and use. The Library website can be confusing for professional and non-professional users to navigate when they seek geospatial data and services, information about Library geospatial coordination activities, and points of contact for specific kinds of geospatial data or GIS services. This can discourage users or hamper them from finding resources of interest to them. For example, someone seeking the Natural Resources Information System (NRIS), a major GIS program within the Library, would find NRIS in the left side main navigation menu only if they tipped open “DIGITAL LIBRARY” and then opened “Geographic Information Clearinghouse”. Another example is that the Digital Library page (digitallibrary.msl.mt.gov) is entirely about geospatial data to the exclusion of other digital holdings within the library. Some reorganization of web content may already be underway in the Library’s current rebranding project.

2.3 Define incoming communication pathways for support requests and public inquiries. The Library is an information and support resource, including “help desk” GIS support and public inquiries about “maps” that find their way to the Library’s geographic information. These inquiries can consume a lot of staff time. Use existing knowledge of help requests to define common kinds of requests. Where common requests follow a pattern and are frequent, define an efficient workflow - a communication path - to respond to the inquiry. This will help answer inquiries efficiently and with the least staff effort, e.g., sending the query to the right person, the correct web page, another colleague outside of the Library, or whatever is appropriate. Responding to support requests and other queries is a valuable service, so the effort expended in doing so should be tracked to aid in the management of this service. The benefits of this approach are that the Library is better able to respond to inquiries without bogging down staff, and those who make an inquiry of the Library may get an answer that is more complete and timely.

Goal 3. Develop policies and best practices for geospatial data

Goal Description

The Library should lead the development of state government policies for geospatial data as part of its statewide GIS coordination mandate (90-14-4.1.h). Data governance policies will provide a structure in which state government enterprise geospatial data is managed and shared. The Library can also help form professional working groups that develop best practices and standards for all creators, maintainers, and users of framework geospatial datasets, including those outside of state government. By involving the geospatial community, the Library will help coordinate the creation of policies and practices that are useful, practical, and have community buy-in.

Recommendations

3.1 Lead the creation of formal data governance policies for state geospatial data. Data governance is a set of principles and practices that ensure high-quality data throughout the data lifecycle. Data governance policies lay out these principles and practices. The Library is uniquely positioned, per statute, to craft state government data governance policy for geospatial information, since it already performs many of the practices that data governance policy involves: determining data stewardship, defining enterprise data strategies with the Council through the Land Plan and collaboratively with NRIS, and assuring data quality through internal quality control processes and coordination with others. Data governance policy is especially important in the federated data model used in the MSDI because such policies ensure consistently useful themes without requiring a single organization to be the sole maintainer of enterprise data.

Additionally, Montana has recently hired a Chief Data Officer. The Library has the responsibility to assist the Chief Data Officer by bringing its expertise and history of geospatial data and services to bear on statewide policies and actions.

Potential approaches to achieving this goal include defining and convening an appropriate geospatial data governance working group of stakeholders within the state government. The working group would draft policies, and the Library would circulate these for comment as part of its statewide GIS coordination. Policies are only part of data governance – to have value, these policies must be put into practice. Here, too, the Library could provide leadership and coordination by stating how data standards are to be created and/or taking a lead role in the standards development (in working groups, discussed below), including standard proposal, evaluation, revision, and formal adoption.

The benefits of a formal governance policy include clarity of rights and responsibilities making work more efficient. The greatest benefit from data governance is that as data governance policies are put in practice enterprise data quality improves, increasing the value of the information system to users.

3.2 Publicize GIS best practices and educate the geospatial community on them. Best practices are descriptions of standards and processes found to be valuable in accomplishing work and creating high-quality data. Best practices are guidelines with less formal weight than formal policies; they are an appropriate way for the Library to improve statewide coordination by helping GIS users at all levels and

from all organizations. For experienced GIS professionals and organizations, best practices save time by giving guidance. For less experienced GIS users and organizations, best practices are starting points that lead them forward on a productive path. Best practice guidelines, models, and supporting training materials could be products of GIS coordination working groups that the library helps to create (see below).

3.3 Coalesce policy and practice-specific working groups with partners and peers. Rather than taking a top-down approach by proposing policies, practices, or standards and then amending them upon comment, the Library should use its coordinating role to help stakeholders form working groups to focus on specific geospatial policy objectives. By doing so, peers, and those to whom a policy might apply most, will have direct input into policy formation. The Library can coordinate the activities of the groups and manage them for consistency and transparency. Many topics might be addressed by working groups, including best practices (discussed above). Various MSDI work groups already exist and have proven to be valuable, e.g., LiDAR, Land Cover, Imagery. Some ideas that have percolated to the top for working groups include:

- State government geospatial data governance policy (discussed above)
- Best practices and means for sharing authoritative datasets that are outside of the current MSDI or Library geospatial programs (e.g., Department of Natural Resources and Conservation authoritative geospatial data, Montana Department of Transportation authoritative datasets that are not part of the MSDI transportation theme).
- Workflows and repositories for archiving authoritative data as it is replaced by newer data
- Building and structure address standardization and best practices
- Security, sensitivity, and personally identifiable information best practices for geospatial data
- Best practices for interagency data-sharing agreements
- Best practices and policies for sharing state agency data with the public

Working groups focus on creating products (documents, examples, training materials, white papers) that are technology-neutral, accessible to a wide audience of stakeholders, and where possible provide practical examples and case studies. The Library can use its expertise in communication to help working groups design and create effective products. The Library can also assist working groups by using its communication tools to circulate drafts for comment and, ultimately, promulgating working group results. Training materials and other necessary concomitants of a policy or best practice could be hosted at the Library as part of its coordinating role. A benefit of a working group approach is that effort can focus on issues of immediate importance, addressing those issues swiftly and practically.

3.4 Promote policies that foster the use of authoritative datasets to ensure efficiencies and cost savings. For example, address points are used for both elections and NG911. Another example is that road centerlines are used for MT Department of Transportation purposes, NG911, and local government. Low distortion projections (LDP's) are a third example where Library coordination can have value – especially appropriate because LDP users often rely upon another valuable Library effort, the Real Time

Network (RTN). Other examples of datasets that are often used in multiple ways include elevation, hydrography, survey corners, and parcel boundaries.

Goal 4. Continue to improve the collection, maintenance, and dissemination of authoritative land information

Goal Description

The Library does excellent work collecting and maintaining data. The Library also has an excellent suite of datasets, web services, web maps, online applications, and direct data sharing with partners to disseminate data. MSL should continue improving its products and related coordination efforts as the use of geospatial data continues to expand, expectations about GIS data and services grow, and information system technologies change over time.

Recommendations

4.1 Define and implement a state agency archive for geospatial data. By statute, the Library is the repository or archive of authoritative state agency datasets. As well, library science has been the most advanced field of study for digital archiving and metadata to support the use of digital data. To date, there is no formal archive to which agencies can contribute their geospatial data. Define how the repository will be structured for ease of data discovery and access and seek to implement the repository. Recognize that this may involve additional costs and determine an appropriate cost model to use with other agencies. A state government geospatial data repository will have many benefits, including disaster recovery and, like any historical documents, providing context for agency decisions and actions.

4.2 Improve data collection by defining and/or documenting existing update processes. Datasets in the Montana Spatial Data Infrastructure (MSDI) are updated routinely through the coordination efforts of the Library. Non-MSDI datasets may not have update processes. MSDI and non-MSDI datasets would benefit from having formal, documented update processes. The work of defining update processes will reveal where more coordination is needed with data providers. Processes could include timing (schedule or interval) and the data format. The benefits of documented update processes are consistent datasets that are easier for users to evaluate for suitability, defined workloads for Library staff and partners who are contributing data, and identification of data themes that might demand more coordination effort from the Library.

4.3 Improve data maintenance by making it easy for users to report issues with services and data. Errors and inconsistencies in datasets maintained by the Library are uncommon. However, when an error or inconsistency is found by a data user, the Library should have a straightforward way to report the problem. This need not be elaborate or complicated. For instance, this could be a simple web page that collects information from the service or data user. Library staff can then investigate the problem and

respond to the reporter (or direct them to a resource that will help them, as discussed in the communications goal of this plan). The Library might also consider some form of error report and resolution log (essentially a ticketing system) so that users can be confident that data quality is actively maintained. Ticketing could be an element in the communication plan.

4.4 Improve data dissemination. The Library's geospatial resources are used by an ever-widening pool of professional and non-professional patrons. The Library has to meet these user needs by increasing the variety of ways it disseminates data and provides services, striving to do so in technology-neutral formats. Based on stakeholder input the following improvements should be considered.

- Web services must be readily discoverable and useful in a variety of formats. Make it easier for users to work with data in their specific geographic areas of interest, rather than having to download data or use only pre-set symbols provided by map services. Evaluate and put in place tools that support filters by attributes as part of clip-zip-ship, or that access caches of tiles/data for LiDAR, orthoimagery, and similar large datasets, perhaps managed through a streaming content management system (as Utah does).
- Inform users of data format options. Some datasets are available in multiple formats. For example, hydrography might be available in two different web service formats (as a feature service and map service), as downloadable map images (raster datasets), and as downloadable vector data. Users should be shown the various formats with appropriate links.
- Make it easy to explore data available through the MSL, even for non-GIS users (the general public), starting by defining an improved version of the Digital Atlas. Consider that users are interested in topics (e.g., planning a hunt or finding a fishing spot) more often than they are in data. Make sure interfaces start from topics and lead to the viewing of data, along with more traditional "data-oriented" ways to see what is available from the Library.
- The clearinghouse should act as an index that provides pointers to authoritative data sources even if they are not hosted by MSL. This requires constant coordination with partners to ensure updated metadata is always available in the clearinghouse. This may also involve explicitly building federated data networks (see partnerships discussion below).

Goal 5. Create and strengthen partnerships

Goal Description

Through its geospatial programs and statewide coordination activities, the Library has built many partnerships at all levels: state, local, federal, and tribal agencies, and among private sector organizations and educational institutions. Partners and collaborators value their relationships with MSL. The Library has opportunities to build upon its established partnerships, strengthen relationships, and build new

partnerships. It's important to formalize relationships begun at an individual level into interagency partnerships that are sustainable beyond the tenure of individuals in the Library and the partner organization.

Recommendations

5.1 Create a business plan to define how to assist other government entities (local, state agencies, tribal) to become GIS-enabled through enhanced coordination activities. The Library is already helping many organizations to gain GIS capabilities. These activities are a great strength of GIS coordination in Montana, and bear reiteration in this strategic plan, even if many are already in place:

- Continue seeking discounted software licensing to assist partners in building GIS capacity.
- Encourage formal data partnerships.
- Consider assisting tribes in sharing GIS standards, best practices, and activities, especially regarding statewide geospatial information.
- Provide incentives for local governments, state agencies, and other partners to develop or improve data used in statewide datasets (e.g., in Massachusetts the state hired vendors to do initial data creation for local governments with the proviso that continued funding depends upon local update of the data).

5.2 Explore models for regional collaboration. GIS implementation can be challenging for rural governments - they don't have sufficient funding or a need for full-time specialized staff, but it is too much work or expertise to add to an existing staff position. One way to assist rural governments is to promote teaming to encourage sharing GIS technology and staff. MLIA grants could be a support mechanism for teaming.

5.3 Use national and statewide initiatives (e.g., NG9-1-1, Broadband) to strengthen relationships with counties. National and statewide initiatives can appear suddenly (like the need for pandemic data management) or through regular legislative processes (like the 2021 infrastructure bills). These national initiatives, and statewide initiatives when they occur, are an opportunity to build the Library's services and alliances with local governments and with other state agencies. Showcase MSL's abilities by providing education (e.g., emergency services coordinators), tools (e.g., visualization and quality control tools), and frequently updating Montana's communities about progress. Seek new opportunities in other statewide or national information system realms as opportunities arise.

5.4 Demonstrate leadership and expertise to national peers to build new and strengthen existing partnerships. Montana has been a leader in several data development efforts with federal agencies. For example, Montana's cadastral database is cited as a national model for statewide integration of land information systems and GIS. Continuing to demonstrate expertise and leadership may help to open additional federal support for Montana geospatial data developments. For instance, federal partnerships might assist with high-resolution mapping control to support the Real Time Network. The Geospatial Data Act, various federal lands initiatives, and national investment in local infrastructure are all areas in

which participation at the national level could yield funding and/or partnerships that build or enhance geospatial information.

5.5 Define partnership structures that are easy for the Library to maintain, including regular communication between partners. The Library has several strong partnerships that need to be nurtured with regular communication (e.g., ensuring the Library has a standing presence in important partner meetings such as the MACO annual meeting), and formalized through memoranda of understanding or similar written arrangements (e.g., with federal partners where personal professional relationships are the basis of several ongoing efforts).

Prioritization and Timeline

All of the strategic goals identified in this plan are very important, which is why they surfaced to the top and made it into the plan. However, the goals have been prioritized based on their relative importance when considered together. The goals are prioritized based on the level of impact achieving them will have on the entire Montana GIS Stakeholder community. Figure 4 lists the goals in priority order with the most important uppermost.

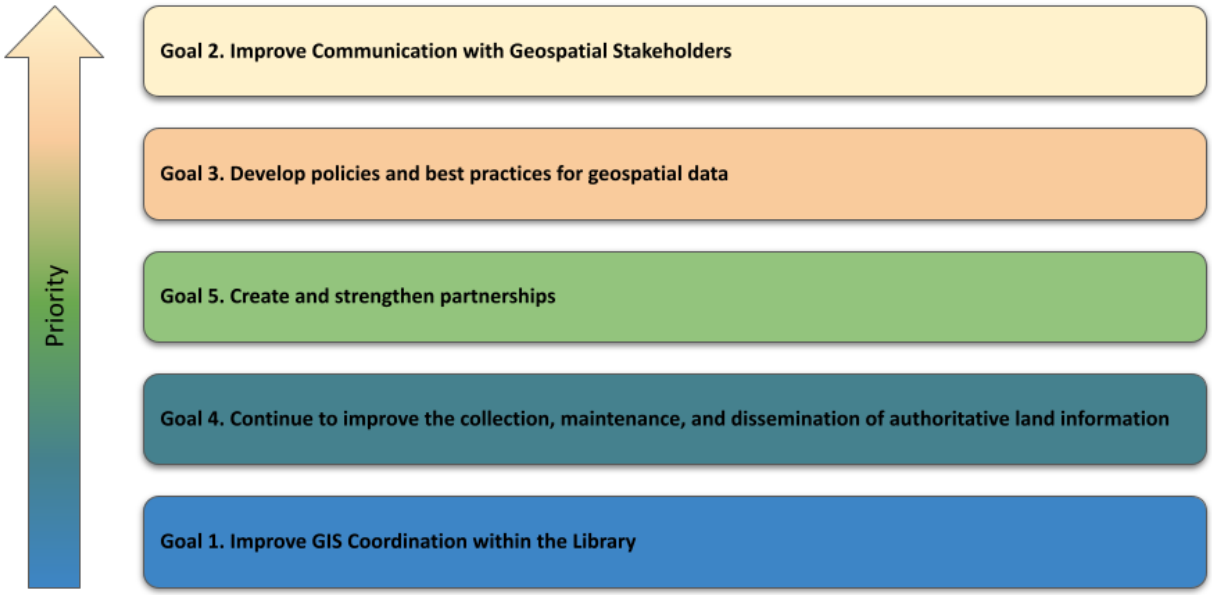


Figure 4. Prioritization of Strategic Goals

It is useful to consider the recommendations in terms of the relative time frames for implementing each recommendation. A suggested implementation timeline chart is presented below (Figure 5) and in Appendix 6. This adds the dimension of time duration as a perspective on the goals. Note that these

timeframes consider both the consumption and availability of resources as well as the need for coordination. Generally speaking, the higher the need for resources the longer the timeframe required to accomplish the recommendation. Likewise, the more coordination that is required to accomplish a recommendation the longer the timeframe that will be needed. The timeframes also consider the interdependencies between the recommendations as indicated in the timeline notes. Also, this chart indicates that the effort associated with some recommendations is ongoing. In these cases, we are showing the optimum time frame to place emphasis on the recommendation rather than the entire time frame. The chart presents the time in terms of quarters within implementation years (Years 1 - 5) but does not prescribe in which actual year or quarter the timeline will begin.

	Goals and Recommendations	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Ongoing?	Timeline Notes
1.	**Improve GIS Coordination within the Library**																						
1.1	Clarify roles and responsibilities for MSL Work Group Areas as they pertain to geospatial activities.																						Other process and policy activities would help to make clear how roles and responsibilities should be structured. Should revisit this annually.
2.	**Improve Communication with Geospatial Stakeholders**																						
2.1	Create and execute on a formal communications plan for MSL GeoInfo.																						
2.2	Reorganize the Library GIS web content to make it easier to discover and use.																						May be included in current rebranding effort.
2.3	Define incoming communication pathways for support requests and public inquiries.																						
3.	**Develop policies and best practices for geospatial data**																						
3.1	Lead the creation of formal data governance policies for state geospatial data.																						
3.2	Publicize GIS best practices and educate the geospatial community on them.																					Y	Will follow working group tasks and data governance policies, since these will define best practices.
3.3	Coalesce policy and practice-specific working groups with partners and peers.																						Can start fairly quickly, because several areas of concern / interest are already defined
3.4	Promote policies that foster the use of authoritative datasets to ensure efficiencies and cost savings.																					Y	Will need to follow initial policy efforts from 3.1 and 3.3
4.	**Continue to improve the collection, maintenance, and dissemination of authoritative land information**																						
4.1	Define and implement a state agency archive for geospatial data.																						Dependent on 3.1 defining archive policy as part of governance
4.2	Improve data collection by defining and/or documenting existing update processes.																						
4.3	Improve data maintenance by making it easy for users to report issues with services and data.																						
4.4	Improve data dissemination.																						
5.	**Create and strengthen partnerships**																						
5.1	Create a business plan to define how to assist other government entities (local, state agencies, tribal) to become GIS-enabled through enhanced coordination activities.																						Might like to start sooner, but already have communications plan starting in Y1, Q1.
5.2	Explore models for regional collaboration.																						The timing of this might change depending on what a business plan (see 5.1) states about assisting other government entities.
5.3	Use national and statewide initiatives (e.g., NG9-1-1, Broadband) to strengthen relationships with counties																					Y	Input to the communication plan and also taking advantage of favorable funding opportunities in near-term; Ongoing work in later quarters continues building strong relationships
5.4	Demonstrate leadership and expertise to national peers to build new and strengthen existing partnerships.																					Y	Initial year is used to build relationships, then ongoing effort is staying in communication with them.
5.5	Define partnership structures that are easy for the Library to maintain, including regular communication between partners.																						Comes out of the communication plan

Figure 5. Goal and Recommendations 5-year Implementation Timeline

Monitoring & Measuring Progress and Success

While this plan presents a multi-year vision and set of recommendations, the conditions (organizational, political, technological) in which this plan was formed will evolve over time. It will be essential to revisit the plan periodically and to recalibrate priorities based on what has been achieved as well as new developments. Ultimately, strategic planning – particularly for technology – must be viewed as an ongoing effort and not a one-time exercise. We recommend a collaborative, quarterly review of the strategic goals and recommendations with input from both the Library and the Council to (1) assess progress as compared to the schedule/priorities presented in this plan and (2) to recalibrate goals based on new information/circumstances. This quarterly snapshot should be captured using the following chart (Figure 6), or a similar rubric. Ratings are based on a qualitative assessment, all things considered. This success rubric is also included as a spreadsheet in Appendix 7.

Strategic Goal	Overall Goal Status (Color-Code)*	Recommendations	Comment or Suggested Recalibration (Color-Code for Recommendation Status)*
1. Improve GIS Coordination within the Library		1.1 Clarify roles and responsibilities for MSL Work Group Areas as they pertain to geospatial activities.	
2. Improve Communication with Geospatial Stakeholders		2.1 Create and execute on a formal communications plan for MSL GeoInfo.	
		2.2 Reorganize the Library GIS web content to make it easier to discover and use.	
		2.3 Define incoming communication pathways for support requests and public inquiries.	
3. Develop policies and best practices for geospatial data		3.1 Lead the creation of formal data governance policies for state geospatial data.	
		3.2 Publicize GIS best practices and educate the geospatial community on them.	
		3.3 Coalesce policy and practice-specific working groups with partners and peers.	
		3.4 Promote policies that foster the use of authoritative datasets to ensure efficiencies and cost savings.	
4. Continue to improve the collection,		4.1 Define and implement a state agency archive for geospatial data.	
		4.2 Improve data collection by defining and/or	

maintenance, and dissemination of authoritative land information		documenting existing update processes.	
		4.3 Improve data maintenance by making it easy for users to report issues with services and data.	
		4.4 Improve data dissemination.	
5. Create and strengthen partnerships		5.1 Create a business plan to define how to assist other government entities (local, state agencies, tribal) to become GIS-enabled through enhanced coordination activities.	
		5.2 Explore models for regional collaboration.	
		5.3 Use national and statewide initiatives (e.g., NG9-1-1, Broadband) to strengthen relationships with counties	
		5.4 Demonstrate leadership and expertise to national peers to build new and strengthen existing partnerships.	
		5.5 Define partnership structures that are easy for the Library to maintain, including regular communication between partners.	
*Color Key (during operational use, cells in the preceding table will be color-coded and comments added as appropriate).			
Color: Rating			
Blue: Not yet started			
Green: Fully meets expectations and requirements (e.g., on schedule and achieving desired outcome)			
Yellow: Partially meets expectations and requirements (e.g., behind schedule, but making reasonable progress toward desired outcome)			
Red: Not meeting expectations and requirements (e.g., behind schedule and very little or no progress toward desired outcome))			

Figure 6. Measuring Success Rubric

Appendices

Appendix files are located at this Teams Folder Link

1. **Survey Synopsis (PDF Slides)**
2. **Workshop #1 (Technical Participants) Summary (PDF)**
3. **Workshop #2 (Non-Technical Participants) Summary (PDF)**
4. **Stakeholder Interviews List (Excel)**
5. **SWOT Summary (Excel)**
6. **Recommendations Timeline (Excel)**
7. **Measuring Success Rubric (Excel)**